FACTS

SINTEF Materials and Chemistry

"Skin Model" for textile testing

October 2010

Measurement of textile's water permeability and thermal properties

(from - 20°C to + 99°C)

The Sweating Guarded Hotplate, often referred to as the "skin model", produces accurate, repeatable measurements of the thermal resistance and vapor permeability of textiles. These values indicate a materials insulation and 'breathability' performance.

Application

The skin model is a new addition to the suite of textile and physiological testing offered by SINTEF. It is a convenient tool for assessing and screening performance of a textiles and is valuable to be used in conjunction or as an alternative to the thermal manikin or physiological measurements. The equipment is a unique model developed specifically for SINTEF and is the only skin model of it's kind with an ability to test in conditions below room temperature and down to -20°, meaning only SINTEF has the ability to test textiles in simulated arctic conditions.

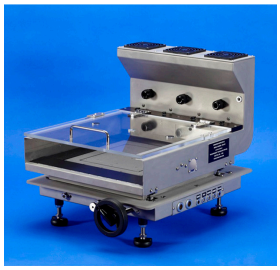

Fig 1. The sweating guarded hot plate or 'skin model'.

Simulation of human skin

The skin model consists of a porous aluminum plate which is maintained at 37°C to replicate the human skin temperature, additionally water vapor is passed at a controlled humidity through the porous plate to mimic sweating. In this way the sweating guarded hotplate simulates the behavior of human skin.

Variable environmental simulation

Textiles samples are laid on top of the porous plate and a placed into a controlled environmental chamber, where the external temperature, humidity and wind speed can all be varied to simulate different environmental conditions. Unique in Europe this equipment can be used to measure the textiles performance to as low as -20°C, a realistic environment for workers and athletes in high north areas.

A Reliable measurement technique

A temperature and humidity sensor placed between the porous plate and the textile monitors changes in temperature and water vapor until a steady state condition is achieved. The Thermal Resistance 'Rt' and Evaporative Resistance 'Ret' are then derived from the energy input required to maintain the steady state.

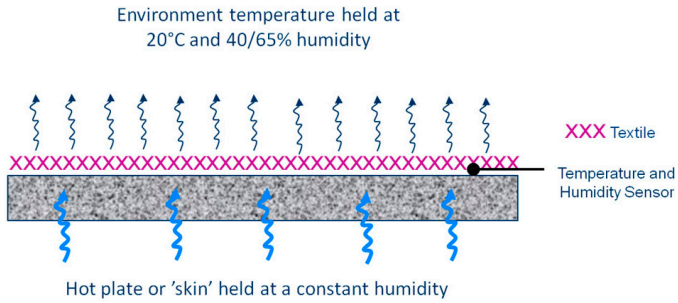

Fig 2. The test set up of the porous plate, textile and temperature sensor in a controlled environment.

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